

## **Engineering Design File**

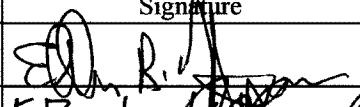
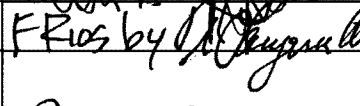
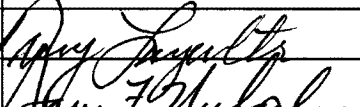
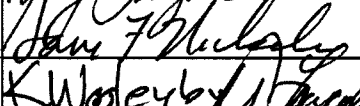
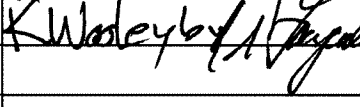
PROJECT NO. 23833

# **OU 7-13/14 In Situ Grouting Project Environmental, Safety, and Health**



**OU 7-13/14 In Situ Grouting Project  
Environmental, Safety, and Health**

EDF No.: 5152 EDF Rev. No.: 0 Project File No.: 23833

1. Title: <u>OU 7-13/14 In Situ Grouting Project Environmental, Safety, and Health</u>				
2. Index Codes:				
Building/Type		<u>WMF-700</u>	Radioactive Waste	
<u>Subsurface Disposal Area</u>		SSC ID <u>N/A</u>	Site Area <u>Management Complex</u>	
3. NPH Performance Category: _____ or <input checked="" type="checkbox"/> N/A				
4. EDF Safety Category: _____ or <input checked="" type="checkbox"/> N/A SCC Safety Category: <u>Grade</u> or <input type="checkbox"/> N/A				
5. <b>Summary:</b> Radiation protection, industrial hygiene, safety, monitoring, sampling, decontamination, and waste management activities will be documented.				
<b>Purpose:</b> To describe radiation protection, industrial hygiene, safety, monitoring, sampling and decontamination, and waste management activities during the performance of In Situ Grouting Project operations.				
<b>Scope:</b> In situ grouting has been identified as a viable remedial action to address near-term risks posed by some contaminants in the Subsurface Disposal Area. The scope of the project includes two grouting functions: first, waste matrix contaminant grouting to mitigate further migration of selected contaminants; and second, foundation grouting to enhance waste stability to support a future cap.				
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		Subsurface Disposal Area	Site Area	Radioactive Waste Management Complex
13.	Registered Professional Engineer's Stamp (if required) N/A			

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## **ACRONYMS**

ACGIH	American Conference of Government Industrial Hygienists
EDF	engineering design file
ES&H	environmental, safety, and health
EZ	entry zone
INEEL	Idaho National Engineering and Environmental Laboratory
ISG	in situ grouting
MCP	management control procedure
PPE	personal protective equipment
PRD	program requirements document
RadCon	radiological control
RCT	radiological control technician
RWMC	Radioactive Waste Management Complex
RWP	radiation work permit
SDA	Subsurface Disposal Area
WGS	Waste Generator Services

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# **OU 7-13/14 In Situ Grouting Project Environmental, Safety, and Health**

## **1. PURPOSE**

The purpose of this engineering design file (EDF) is to describe environmental, safety, and health (ES&H) controls for radiation protection, industrial hygiene, safety, monitoring, sampling and decontamination, and waste management activities during the performance of the Operable Unit (OU) 7-13/14 In Situ Grouting (ISG) Project (also referred to as the “project”).

## **2. BACKGROUND**

In sit grouting has been identified as a viable remedial action to address near-term risks posed by some contaminants in the Subsurface Disposal Area (SDA) (see Figure 1), which is located at the Radioactive Waste Management Complex (RWMC). This project includes two grouting functions: first, waste matrix contaminant grouting to mitigate further migration of selected contaminants; and second, foundation grouting to enhance waste stability to support a future cap.

## **3. SCOPE**

This EDF provides the ES&H and secondary waste handling requirements, design criteria, assumptions, risks, and conclusions associated with conducting ISG activities at the SDA.

## **4. REQUIREMENTS**

29 CFR 1910, 2004, “Occupational Safety and Health Standards,” *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1926, 2002, “Safety and Health Regulations for Construction,” *Code of Federal Regulations*, Office of the Federal Register.

42 USC § 9601 et seq., 1980, “Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA/Superfund),” *United States Code*.

American Conference of Government Industrial Hygienists (ACGIH), 2001, *Threshold Limit Values Booklet*, American Conference of Government Industrial Hygienists.

INEEL Subcontractor Requirements Manual.

## **5. SYSTEM CLASSIFICATIONS, CATEGORIZATIONS, AND DETERMINATIONS**

An ISG safety authorization basis document is being written to address the issue of system safety classification; however, the following determination will be assumed until the document is issued:

1. All equipment is classified as consumer grade.

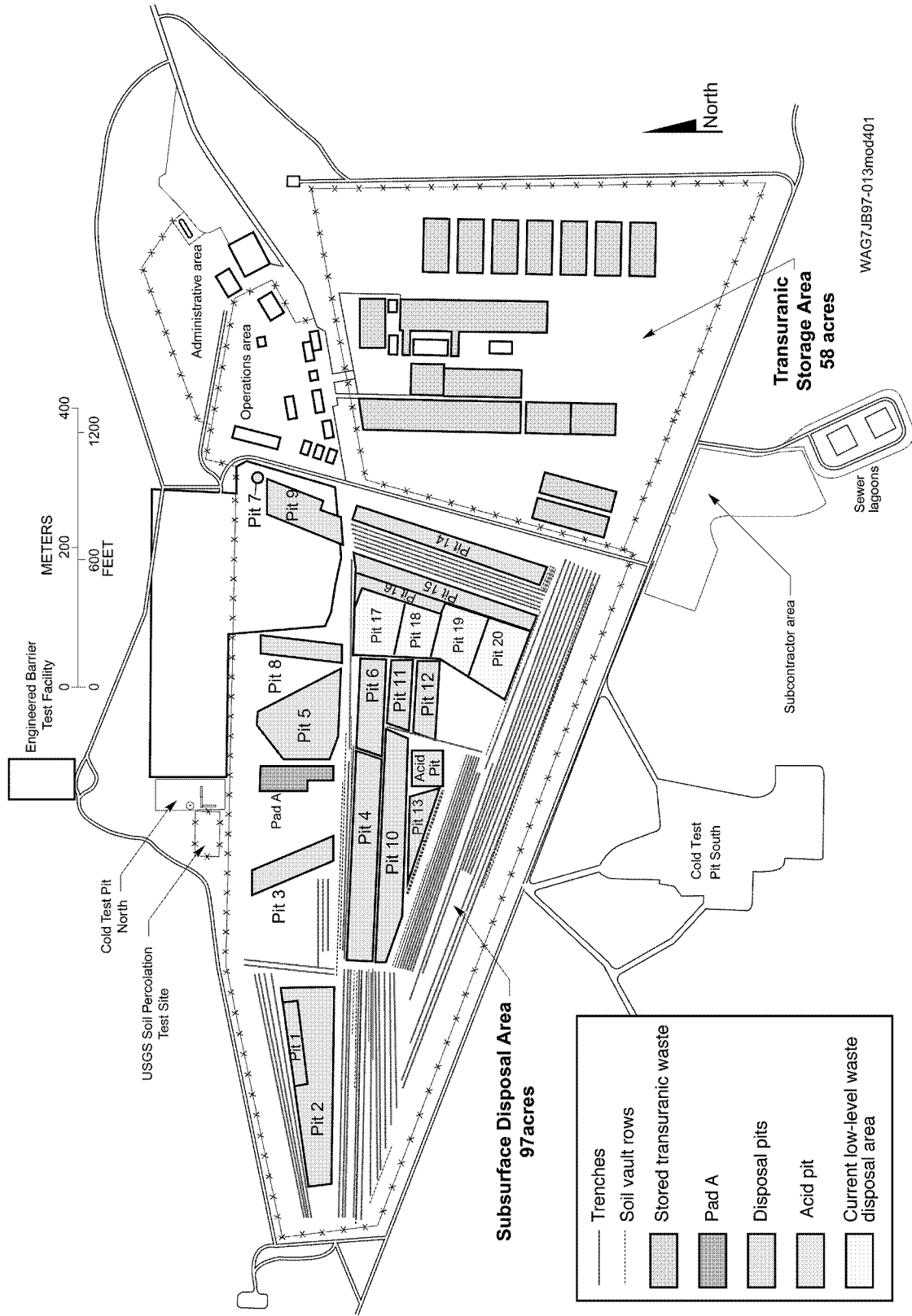


Figure 1. Map of the Radioactive Waste Management Complex, showing location of the Subsurface Disposal Area.

The high-pressure pump, downstream piping, and pressure-retaining drill string components are assumed to be consumer grade with appropriate controls to verify equipment compliance to consensus codes and standards.

## **6. ASSUMPTIONS**

1. Radiological control technicians (RCTs) will be available at selected points to preclude work slowdown.
2. Personnel decontamination facilities will be available.
3. Equipment decontamination facilities will not be available.
4. Lessons learned data will be obtained and evaluated from the beryllium block grouting efforts being conducted in calendar year 2004 to determine the need for administrative controls for hazardous materials (e.g., volatile organic compounds and metals) and the effectiveness of the open shroud and grout containment unit.
5. Waste generated by the ISG Project will be solid, nonhazardous waste and will be accepted for disposal at the Idaho National Engineering and Environmental Laboratory (INEEL) Landfill Complex.

## **7. DESIGN CRITERIA**

### **7.1 Applicable Design Codes and Standards**

There are no specific design codes or standards associated with operating or maintaining ISG equipment. Project requirements and design requirements (see Section 7.2) associated with operating and maintaining ISG project equipment are project-specific. Design codes and standards for the grout storage, mixing, and delivery equipment; for project support equipment and systems; and for ensuring worker safety are specified in the following project EDFs:

- EDF-5135, "OU 7-13/14 In Situ Grouting Project Grout Storage and Mixing"
- EDF-5102, "OU 7-13/14 In Situ Grouting Project Grout Delivery System"
- EDF-5153, "OU 7-13/14 In Situ Grouting Project Hydraulic Excavator and Drill-Injection Rig"
- EDF-4933, "OU 7-13/14 In Situ Grouting Project Grout Measurement and Control"
- EDF-5144, "OU 7-13/14 In Situ Grouting Project Support Facilities"
- EDF-5150, "OU 7-13/14 In Situ Grouting Project Support Systems"
- EDF-5122, "OU 7-13/14 In Situ Grouting Project Electrical Utilities"
- EDF-5162, "OU 7-13/14 In Situ Grouting Project Support Vehicles"
- EDF-5152, "OU 7-13/14 In Situ Grouting Project Environmental, Safety, Health, and Quality Assurance."

## **7.2 Radiological Control Trailer**

A radiological control (RadCon) trailer will be located adjacent to the task site area. Site boundaries or “zones” will be established to ensure that access into the project area is controlled and that project and nonproject personnel are aware of controlled and potential hazard areas. Access into and egress from the project site entry zone (EZ) will be through the RadCon trailer at specified entry/egress control points.

Portable radiological survey instruments for performing hand and foot surveys at the boundaries will be located at normal entry and egress points, and whole-body surveys on an Eberline personnel contamination monitor, Personnel Contamination Monitor-2, or equivalent, will be required before leaving the SDA. Radiological survey instrumentation will include portable beta, gamma, and neutron radiation detection instruments and alpha, beta, and gamma contamination instruments that will be maintained under the control of the RWMC Radiation Protection organization.

## **7.3 Air Sampling**

Air sampling for hazardous constituents will be obtained when required by RadCon/industrial hygiene. Beta, gamma, and neutron radiation levels will be monitored at the drill point when required by RadCon/industrial hygiene.

## **7.4 Threshold Limit Value-Time Weighted Average/Permissible Exposure Limits**

If chemical contamination levels are detected at or above the threshold limit value, exposure limits, or applicable action levels for specific chemical contaminants, the safety engineer or industrial hygienist will evaluate the condition and, if required, additional controls or personal protective equipment (PPE) will be provided before restart of work tasks.

## **7.5 Beta, Gamma, and Neutron Radiation Fields**

Beta, gamma, and neutron radiation fields and radioactive contamination detected above the limits specified on the radiological work permit (RWP) will require the work activity to be stopped in a safe condition and all personnel will exit the work area. The RCT will evaluate the condition and notify RadCon management. RadCon management will determine the specific actions necessary to deal with the elevated radiation fields or the spread of radioactive contamination.

## **7.6 Decontamination Procedures**

Radiological decontamination of equipment, materials, and sample containers will be a regular part of the drilling operations. Sample containers used for the collection of grout return samples will have the highest chance for encountering radiological contamination. Every effort will be made to prevent radiological contamination of personnel and equipment through the use of engineering controls; isolation of source materials; having continuous RCT monitoring of radiation, contamination, and airborne radioactivity; use of PPE; personnel training; and by following all radiological contaminated material handling requirements and procedures. Sections 7.7 and 7.8 provide contingencies for decontamination if radiological contamination is encountered.

## **7.7 Contamination Control and Prevention**

Radiological contamination control procedures will be implemented throughout the project to minimize personnel contact with contaminated surfaces. At project sites in the SDA, the following radiological contamination control and prevention measures will be employed:

1. Identify potential sources of radiation areas, high radiation areas, and radiological contamination by having RCTs conduct frequent radiation and radiological contamination surveys.
2. Design confinement, isolation, and engineering controls to eliminate or mitigate any potential for contact with or release of known sources of radiological contamination.
3. If radiological contamination is found, immediately implement radiological control procedures to prevent the spread of radiological contamination.
4. Minimize the number of personnel in the immediate area (within 15 m [50 ft]) during drill string advancement.
5. Wear appropriate PPE where required.

Note: Any radiological contamination detected above those levels listed in the “Limiting Conditions that Void the RWP” Section of the RWP will immediately result in a stop work action and void the RWP. Any radiological decontamination required will be performed under a separate RWP.

## **7.8 Personnel and Equipment Decontamination**

Radiological control procedures for personnel and equipment will be necessary to control contamination from radiological and hazardous constituents, and to protect personnel if it is encountered. All radiological decontamination operations for equipment and areas shall be performed in accordance with the following INEEL companywide manuals, or subcontractor documentation with equivalent controls approved by the contractor:

- Manual 15A, *Radiation Protection INEEL Radiological Control Manual*, (Program Requirements Document [PRD]-183)
- Manual 15B, *Radiological Protection Procedures*
- Manual 15C, *Radiological Control Procedures*
- Manual 15D, *Radiological Instrument Calibration Procedures*.

Nonradiological contamination is not expected to be present without some detectable radiological contaminants, given the nature of the waste materials disposed of in the SDA over the years.

## **7.9 Welding and Fire Protection**

It may be necessary to perform welding activities in the SDA during maintenance and repair of project equipment. Welding activities will be performed in accordance with the *Subcontractor Requirements Manual* and Program Requirements Document (PRD)-2010, “Cutting, Welding, and Other Hot Work.” Additional radiation control measures may be imposed to minimize the spread of contamination and protect the workers. Welding activities will require the review and approval by a

qualified contractor (i.e., company) employee as identified by PRD-2010. Additional project-specific fire protection requirements, guidance, and information are found in EDF-5054, "OU 7-13/14 In Situ Grouting Project Fire Protection."

## **7.10 Secondary Waste**

Secondary waste is generated from support activities related to sampling, maintenance, and operating activities. Examples of secondary waste include waste associated with routine decontamination activities (excluding facility closure), PPE, administrative area and support service waste, used equipment and filters (e.g., air, water, and grout), and other similar waste.

Sample collection waste includes used disposable sampling tools (e.g., scoops and spatulas), wipes, plastic bags, and PPE that were used in the collection and processing of samples within the confines of the project.

Radioactively contaminated secondary waste will be handled as described in Section 7.11. Secondary waste designated as industrial waste will be handled as described in Section 7.12.

## **7.11 Radioactively Contaminated Waste**

A pollution prevention/waste management plan (as described in Section 7.14) will be developed by project personnel under the direction of Waste Generator Services (WGS). Low-level waste will be disposed in the bulk low-level waste pit located at RWMC.

Any materials, including drill strings and bits, determined for waste disposal shall be surveyed for radioactive contamination by an RCT before removal from and loading onto the vehicle for transport from the area.

RadCon personnel shall survey all subcontractor equipment, including drill strings and bits, before release for removal from the SDA. Equipment radioactively contaminated beyond the release requirements of Management Control Procedure (MCP)-425, "Radiological Release Surveys and the Control and Movement of Contaminated Materials," cannot be released for removal from the INEEL.

## **7.12 Industrial Waste**

Industrial waste is solid waste that is neither radioactive nor hazardous. At the INEEL, industrial waste streams are typically disposed of at the INEEL Landfill Complex. Examples of project-generated industrial waste include hoses and fittings. Many types of Comprehensive Environmental Response, Compensation, and Liability Act industrial waste are generated in an area of contamination as a result of material used in a remediation project that the generator believes has not been contaminated with either radioactive or hazardous materials. This absence of contamination is validated by radiation surveys. A general hazardous waste determination is prepared for routinely generated industrial waste to document that the waste is neither radioactive nor hazardous.

Industrial waste streams that have a higher probability of containing constituents restricted from disposal are considered nonroutine and will undergo a waste stream-specific hazardous waste determination. This determination is accomplished by sampling, performing radioactive surveys, using process knowledge of the waste-generating process (e.g., determining if the waste was mixed with a listed waste or derived from the treatment, storage, or disposal of a listed waste), and evaluating the composition of the industrial waste.

WGS personnel evaluate Comprehensive Environmental Response, Compensation, and Liability Act industrial waste to determine if the waste meets the industrial waste acceptance criteria. Industrial waste is generally collected in industrial waste collection dumpsters posted with signs describing acceptable and prohibited items.

### **7.13 Hazardous Waste**

Hazardous waste will be identified in accordance with the evaluation process described above. It is likely that hazardous waste will be dispositioned to the INEEL Comprehensive Environmental Response, Compensation, and Liability Act Disposal Facility or to off-site treatment, storage, and disposal facilities in accordance with INEEL management and the management and operating contract. Hazardous waste will be managed per MCP-69, "Waste Generator Services—Hazardous Waste Management."

### **7.14 Pollution Prevention and Waste Minimization**

The pollution prevention and waste minimization plan identified in Section 7.11 provides techniques that have been and will continue to be incorporated into planning and daily work practices to improve work safety and efficiency and to reduce environmental and financial liability. Examples of practices the project will institute to support pollution prevention and waste minimization include:

1. Implement a statistical sampling approach that, by minimizing the numbers of samples taken, minimizes the generation of sample collection waste (e.g., disposal scoops and sample jars) and reduces the waste generated resulting from laboratory analysis.
2. Control transfer of samples between contaminated zones and clean areas, which minimizes the spread of contamination and generation of new waste.
3. As part of required pre-job briefings, emphasize waste reduction philosophies and techniques and encourage personnel to continuously improve methods for minimizing generated waste. Specific practices to be implemented include:
  - a. Restricting material, especially hazardous material, that enter radiological buffer areas to that needed for work performance
  - b. Reusing items when practical
  - c. Using dry decontamination to prevent generation of liquid decontamination waste
  - d. Segregating contaminated from uncontaminated waste
  - e. Segregating reusable items (e.g., PPE and tools).

## **8. RISKS**

Because of the human interface considerations that need to be addressed in the design of ISG equipment and systems, risks associated with operating and maintaining ISG equipment and systems are contained in the EDFs that address ISG equipment and system design (see Section 7.1 for a list of applicable project EDFs).

## **9. LOGISTICS SUPPORT**

Mobilization of equipment will occur on two separate occasions. First, at the Cold Test Pit North for demonstration activities; and second, inside the SDA for field operations.

Mobilization of equipment will consist of moving the drill rig, control trailer, RadCon trailer, other support vehicles, and drilling support materials to the project site. The only intrusive tasks that will occur during site preparation and mobilization will be to establish zones and designated work areas using posts.

Site boundaries or "zones" will be established to ensure that project and nonproject personnel are aware of restricted and potential hazard areas. Access and egress from the specific project site EZ will be through the RadCon trailer at specified entry control points.

The RadCon trailer will be located next to the task site area. The RWMC RadCon office (WMF-601) may serve as an alternate location. The RadCon trailer will serve as a radiological survey station when entering and exiting the project work area, and as an instrument storage and calibration area. The RadCon trailer will include mobile communication equipment, such as hand-held radios and a mobile phone.

The office support trailer will be equipped with other administrative support equipment for integrated grouting activities.

Monitoring equipment will be staged and setup. A video monitoring system will be staged and tested.

An emergency response station will be staged near the EZ exit. This station will include:

- Eyewash station (temperature controlled)
- Fire extinguishers (inspected)
- First aid kit (inspected)
- Spill kit.

Personnel safety zones, barriers, and postings will be established, and an equipment safety walk down will be conducted before startup.

Wind speed and contamination levels may require downtime for drill rig operations. Engineered controls (e.g., water or a fixative sprayed on the surface or mats and strategic placement of personnel) may be used to mitigate fugitive dust issues.

## **10. REFERENCES**

29 CFR 1910, 2004, "Occupational Safety and Health Standards," *Code of Federal Regulations*, Office of the Federal Register

29 CFR 1926, 2002, "Safety and Health Regulations for Construction," *Code of Federal Regulations*, Office of the Federal Register

42 USC § 9601 et seq., 1980, “Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA/Superfund),” *United States Code*

ACGIH, 2001, *Threshold Limit Values Booklet*, American Conference of Government Industrial Hygienists

EDF-4933, “OU 7-13/14 In Situ Grouting Project Grout Measurement and Control”

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EDF-5102, “OU 7-13/14 In Situ Grouting Project Grout Delivery System”

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EDF-5150, “OU 7-13/14 In Situ Grouting Project Support Systems”

EDF-5152, “OU 7-13/14 In Situ Grouting Project Environmental, Safety, Health, and Quality Assurance.”

EDF-5153, “OU 7-13/14 In Situ Grouting Project Hydraulic Excavator and Drill-Injection Rig”

EDF-5162, “OU 7-13/14 In Situ Grouting Project Support Vehicles”

*INEEL Subcontractor Requirements Manual*

*INEEL Welding Manual*

Manual 15A, *Radiation Protection INEEL Radiological Control Manual*, (PRD-183)

Manual 15B, *Radiological Protection Procedures*

Manual 15C, *Radiological Control Procedures*

Manual 15D, *Radiological Instrument Calibration Procedures*

MCP-69, “Waste Generator Services—Hazardous Waste Management”

MCP-425, “Radiological Release Surveys and the Control and Movement of Contaminated Materials”

PRD-5110, “Cutting, Welding, and Other Hot Work”